AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1 (Currently Amended): A computer-implemented method comprising:

determining an unstrained amount of web material added to a tension zone in a time period, the time period having a beginning and an end;

determining in real time a tension in the web material at the end of the time period as a function of the unstrained amount of web material added to the tension zone; and

~~calculating tension for a segment of a web material in real time, the segment of the web material being a tension zone; and~~

controlling a first actuator control signal for a first roller as a function of the tension in the tension zone.

Claim 2 (Original): The method according to claim 1, wherein the method further comprises:

controlling a second actuator control signal for a second roller as a function of the tension in the tension zone.

Claim 3 (Currently Amended): The method according to claim 2, wherein the tension zone corresponds to a ~~the~~ segment of web material between the first roller and the second roller;

the first roller being driven at a first desired velocity by the first actuator control signal; and

the second roller being driven at a second desired velocity by the second actuator control signal.

Claim 4 (Canceled)

Claim 5 (Currently Amended): The method of claim 1, further comprising ~~4, wherein calculating a tension for a segment further comprises~~:

determining an unstrained amount of the web material in the tension zone at the beginning of the time period; and

determining the tension in the web material at the end of the time period as a function of the unstrained amount of web material added to the tension zone and the unstrained amount of web in the tension zone at the beginning of the time period.

Claim 6 (Currently Amended): The method of claim 5, ~~wherein calculating a tension for a segment~~ further comprising ~~comprises~~:

determining an unstrained amount of the web material subtracted from the tension zone in the time period; and

determining the tension in the web material at the end of the time period using the unstrained amount of web material added to the tension zone, the unstrained amount of web material in the tension zone at the beginning of the time period, and the unstrained amount of web material subtracted from the tension zone.

Claim 7 (Original): The method according to claim 6, wherein the determining the tension in the web material at the end of the time period comprises:

combining the unstrained amount of the web material added to the tension zone, the unstrained amount of the web material in the tension zone at the beginning of the time period, and the unstrained amount of web material subtracted from the tension zone to determine an amount of web material in the tension zone at the end of the time period;

dividing the amount of the web material in the tension zone at the end of the time period by a length of the tension zone to determine a current strain for the web material; and

converting the strain for the web material to tension.

Claim 8 (Currently Amended): The method of claim 1, further comprising ~~wherein calculating a tension further comprises~~:

receiving a position signal from a position sensor, wherein the position signal indicates a position of the first roller; and

calculating the tension in real-time as a function of the position signal.

Claim 9 (Currently Amended): The method according to claim 1[[4]], further comprising:

receiving a position signal from a position sensor, wherein the position signal indicates a position of the first roller, and

wherein determining the unstrained amount of the web material comprises determining the unstrained amount of web material added to the tension zone as a function of the position of the first roller and a tension value for an upstream tension zone.

Claim 10 (Currently Amended): The method according to claim 1[[4]], wherein the unstrained amount of web material in the tension zone is determined using a previously determined tension value for the tension zone.

Claim 11 (Currently Amended): The method according to claim 1[[4]], wherein the unstrained amount of web material added to the tension zone is determined using a position of the second roller and a previously determined tension value for the tension zone.

Claim 12 (Currently Amended): The method according to claim 1[[4]], wherein the tension in the tension zone at the end of the time period is used to determine an amount of web material added to a downstream tension zone.

Claim 13 (Original): The method according to claim 12, wherein the method further comprises:

calculating a tension for the web material in the adjacent downstream tension zone by:

determining an unstrained amount of the web material added to the adjacent downstream tension zone in the time period, the time period having a beginning and an end;

determining an unstrained amount of the web material in the adjacent downstream tension zone at the beginning of the time period;

determining an unstrained amount of the web material subtracted from the adjacent downstream tension zone in the time period;

determining the tension in the web material at the end of the time period using the unstrained amount of web material added to the adjacent downstream tension zone, unstrained amount of web material in the adjacent downstream tension zone, and unstrained amount of web material subtracted from the adjacent downstream tension zone.

Claim 14 (Currently Amended): A computer-implemented method comprising:

receiving a position signal indicating a position of a first roller in a manufacturing system for a web material;

~~calculating a change in length of the web material within a zone defined by the first roller and a second roller based on the position signal; and~~

determining a change in position of the first roller over a period of time based on the position signal;

calculating a change in length of the web material within a zone defined by the first roller and a second roller based on the determined change in position of the first roller;

calculating a property of the web material based on the change in length by:; ~~and~~

(a) determining an unstrained amount of the web material added to the tension zone in a time period, the time period having a beginning and an end,

(b) determining an unstrained amount of the web material in the tension zone at the beginning of the time period,

(c) determining an unstrained amount of the web material subtracted from the tension zone in the time period,

(d) combining the unstrained amount of web material added to the tension zone, unstrained amount of web material in the tension zone, and unstrained amount of web material subtracted from the tension zone to determine an amount of web material in the tension zone at the end of the time period, and

(e) dividing the amount of web material in the tension zone at the end of the time period by a length of the tension zone to determine a current strain for the web material; and

(f) converting the strain for the web material to a calculated property; and outputting the calculated property of the web material.

Claim 15 (Original): The method according to claim 14, wherein the outputted calculated property is displayed to an operator.

Claim 16 (Original): The method according to claim 14, wherein the method further comprises;

controlling an actuator control signal based on the calculated property of the web material.

Claim 17 (Original): The method according to claim 16, wherein the actuator control signal varies the velocity of the first roller.

Claim 18 (Original): The method according to claim 16, wherein the actuator control signal varies the velocity of the second roller

Claim 19 (Original): The method according to claim 16, wherein the actuator control signal varies a span length between the first roller and the second roller.

Claim 20 (Canceled)

Claim 21 (Original): The method of claim 14, wherein the property comprises one of a tension of the web material, a modulus for the web material, a width of the web material, or a thickness of the web material.

Claim 22 (Canceled)

Claim 23 (Currently Amended): The method according to claim 14[[22]], wherein the unstrained amount of web material added to the tension zone is determined using a position of the first roller and a tension value for an adjacent upstream tension zone at the end of the time period.

Claim 24 (Currently Amended): The method according to claim 14[[22]], wherein the unstrained amount of web material in the tension zone is determined using a previously determined tension value for the tension zone at the beginning of the time period.

Claim 25 (Currently Amended): The method according to claim 14[[22]], wherein the unstrained amount of web material added to the tension zone is determined using a position of the second roller and a previously determined tension value for the tension zone at the beginning of the time period.

Claim 26 (Currently Amended): The method according to claim 14[[22]], wherein the tension in the tension zone at the end of the time period is used to determine an amount of web material added to an adjacent downstream tension zone.

Claim 27 (Original): The method according to claim 26, wherein the method further comprises: calculating a tension for the web material in the adjacent downstream tension zone by:

determining an unstrained amount of web material added to the adjacent downstream tension zone in a time period, the time period having a beginning and an end;

determining an unstrained amount of web material in the adjacent downstream tension zone at the beginning of the time period;

determining an unstrained amount of web material subtracted from the adjacent downstream tension zone in the time period;

determining the tension in the web material at the end of the time period using the unstrained amount of web material added to the adjacent downstream tension zone, unstrained

amount of web material in the adjacent downstream tension zone, and unstrained amount of web material subtracted from the adjacent downstream tension zone.

Claim 28 (Currently Amended): A computer-readable medium comprising instructions for causing a programmable processor to:

receiving a first position corresponding to a position of a first roller;

receiving a second position corresponding to a position of a second roller; and

calculating a parameter for a segment of web material in real time using the first position and the second position by:

determining an unstrained amount of web material added to a tension zone defined by the first roller and the second roller in a time period, the time period having a beginning and an end;

determining an unstrained amount of web material in the tension zone at the beginning of the time period;

determining an unstrained amount of web material subtracted from the tension zone in the time period; and

determining the parameter of the web material at the end of the time period using the unstrained amount of web material added to the tension zone, unstrained amount of web material in the tension zone, and unstrained amount of web material subtracted from the tension zone.

Claim 29 (Canceled)

Claim 30 (Currently Amended): The computer-readable medium according to claim ~~28~~29, wherein the determining the parameter of the web material at the end of the time period comprises:

combining the unstrained amount of web material added to the tension zone, unstrained amount of web material in the tension zone, and unstrained amount of web material subtracted from the tension zone to determine an amount of web material in the tension zone at the end of the time period;

dividing the amount of web material in the tension zone at the end of the time period by a length of the tension zone to determine a current strain for the web material; and

converting the strain for the web material to the parameter.

Claim 31 (Original): The computer-readable medium according to claim 28, wherein the unstrained amount of web material added to the tension zone is determined using a position of the first roller and a parameter value for an adjacent upstream tension zone at the end of the time period.

Claim 32 (Original): The computer-readable medium according to claim 28, wherein the unstrained amount of web material in the tension zone is determined using a previously determined parameter value for the tension zone at the beginning of the time period.

Claim 33 (Original): The computer-readable medium according to claim 28, wherein the unstrained amount of web material added to the tension zone is determined using a position of the second roller and a previously determined parameter value for the tension zone at the beginning of the time period.

Claim 34 (Currently Amended): The computer-readable medium according to claim 28, wherein ~~the parameter of the tension zone~~ at the end of the time period the parameter is used to determine an amount of web material added to an adjacent downstream tension zone.

Claim 35 (Original): The computer-readable medium according to claim 34, wherein the method further comprises:

calculating a parameter for the web material in the adjacent downstream tension zone by:

determining an unstrained amount of web material added to the adjacent downstream tension zone in a time period, the time period having a beginning and an end;

determining an unstrained amount of web material in the adjacent downstream tension zone at the beginning of the time period;

determining an unstrained amount of web material subtracted from the adjacent downstream tension zone in the time period;

determining the parameter of the web material at the end of the time period using the unstrained amount of web material added to the adjacent downstream tension zone, unstrained amount of web material in the adjacent downstream tension zone, and unstrained amount of web material subtracted from the adjacent downstream tension zone.

Claim 36 (Currently Amended): A system comprising:

at least two position sensors generating respective position signals, each position sensor being coupled to a respective roller in a web transport system;

a controller module that calculates a tension for web material based upon the two position signals, and outputs an actuator control signal based upon the calculated tension,

wherein the controller module calculates the tension for the web material in a tension zone formed by the rollers coupled to the at least two position sensors by:

determining an unstrained amount of web material added to the tension zone in a time period, the time period having a beginning and an end;

determining an unstrained amount of web material in the tension zone at the beginning of the time period;

determining an unstrained amount of web material subtracted from the tension zone in the time period; and

determining the tension in the web material at the end of the time period using the unstrained amount of web material added to the tension zone, unstrained amount of web material in the tension zone, and unstrained amount of web material subtracted from the tension zone.

Claims 37-38 Cancelled.

Claim 39 (Currently Amended): The system according to claim ~~36~~38, wherein the determining the tension in the web material at the end of the time period comprises:

combining the unstrained amount of web material added to the tension zone, unstrained amount of web material in the tension zone, and unstrained amount of web material subtracted from the tension zone to determine an amount of web material in the tension zone at the end of the time period;

dividing the amount of web material in the tension zone at the end of the time period by a length of the tension zone to determine a current strain for the web material; and

converting the strain for the web material to tension.

Claim 40 (Original): The system according to claim 39, wherein the unstrained amount of web material added to the tension zone is determined using a position of the first roller and a tension value for an adjacent upstream tension zone at the end of the time period.

Claim 41 (Original): The system according to claim 39, wherein the unstrained amount of web material in the tension zone is determined using a previously determined tension value for the tension zone at the beginning of the time period.

Claim 42 (Original): The system according to claim 39, wherein the unstrained amount of web material added to the tension zone is determined using a position of the second roller and a previously determined tension value for the tension zone at the beginning of the time period.

Claim 43 (Original): The system according to claim 39, wherein the tension in the tension zone at the end of the time period is used to determine an amount of web material added to an adjacent downstream tension zone.